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ABSTRACT

This review into research studying the effectiveness of behavioral objectives in stimulating learning outcomes makes clear that a variety of complex conditions determines whether or not such objectives enhance relevant learning (against specified objectives) and depress, or enhance, incidental learning (against unspecified objectives). There is little doubt that opposing claims attempt to oversimplify what is in fact a complex situation. The development of two distinct schools of thought respectively supporting, and opposing, the use of behavioral objectives has tended to encourage such oversimplification. An alternative approach is required, and it is suggested that this should be one that treats behavioral objectives simply as one of several tools available to educators. Research has already helped to identify some of the advantages and limitations of behavioral objectives, and should be directed towards determining the conditions under which they can be used most effectively. It would then be the responsibility of individual educators to determine whether or not the tool is likely to be useful in their own particular situation. (Author/MB)

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Resolution of Conflicting Claims Concerning Behavioural Objectives

Paper presented to the Annual Meeting of the American Educational Research Association, New York City, April 1977.

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1.0 Introduction

Mager's (1962) classic on Preparing Instructional objectives is generally recognised as having provided a major stimulus to the introduction of behavioural objectives into the field of education. As the use of behavioural objectives was popularised during the 1960s two distinct schools of thought emerged: the one arguing the case for the use of behavioural objectives, and the other the case against. This dichotomy is fully reflected in major reviews of the literature (such as those by Barth (1974), Duchastel and Merrill (1973), Macdonald-Ross (1973), Olson (1973), and Walbesser and Eisenberg (1972)).

In arguing the case for, and against, the use of behavioural objectives a large number of claims have been made. Of these, two are of particular interest, not only because they are repeated time and again, but because they appear to be in direct conflict with one another. Those (such as Gagne (1967), Glaser (1967), Kurtz (1965), Mager (1968), Popham (1969) and Tyler (1964)) who support the use of behavioural objectives typically claim that:

> behavioural objectives clearly indicate to students what is required of them, and as a result student performance improves.

Those (such as Arnstine (1964), Atkin (1968), Eisner (1967), Oakeshott (1962) and Raths (1971)) who express reservations about behavioural objectives typically claim that:

> behavioural objectives discourage students from expanding their horizons by encouraging them to confine their learning to specified objectives.

Unfortunately, much of the dialogue surrounding the strengths and weaknesses of behavioural objectives is based more on emotion rather than on research findings. Duchastel and Merrill (1973), Eisner (1967), Lapp (1972), Walbesser and Eisenberg (1972) all make the same point, stressing that whether or not behavioural objectives are of value is an empirical question.

The purpose of this review, therefore, is to determine what evidence there is to support the two conflicting claims, and where the evidence is contradictory to attempt to find possible explanations.

2.0 Improving Student Performance

Whether or not behavioural objectives enhance student performance appears to be the simpler of the two questions, and it has undoubtedly been the subject of much more research. It will therefore be considered first.

2.1 Empirical Evidence

A substantial number of researchers (including Blaney and McKie (1969), Conlon (1970), Dalis (1970), Doty (1968), Duchastel (1972), Engel (1968), Kueter (1970), Lawrence (1970), McNeil (1967), Morse and Tillman (1972), Olsen (1971), Rothkopf and Kaplan (1972, 1974), and Schuck (1969)) have recorded experiments which lend support to the claim that providing students with behavioural objectives improves their performance.

However, a substantial number of researchers (including Bishop (1969), Brown (1970), Cook (1969), Etter (1969), DeRose (1970), Smith (1967), Stedman (1970) and Tiemann (1968)) have recorded experiments in which the availability of behavioural objectives did not improve student performance, although in none of these instances did the availability of behavioural objectives reduce student performance.

2.2 Discussion of Anomalies

It is clear that behavioural objectives can enhance student performance, but in a number of studies they have failed to do so, even though other variables have been carefully controlled by the nature of the experimental designs involved. In seeking some explanation of this anomaly it is suggested that the conditions in which other variables are held during the studies could be of prime importance. The following studies provide us with some insight into the variables, and conditions of variables, that could affect the usefulness of behavioural objectives.

In reviewing an experiment in which the availability of behavioural objectives had made no difference to student performance Smith (1967) noted that the instructions were presented to students in written form, and might well have been ignored. Clearly, it is not sufficient to simply provide students with behavioural objectives. They must also be aware of them. Engel (1968) followed up this lead with a study in which he carefully noted whether or not students read the objectives provided, and he was able to conclude that behavioural objectives enhanced student performance so long as students were aware of them. Most subsequent researchers have recognised that a condition of student awareness of objectives is important if student performance is to be enhanced.

Dalis (1970) underlined the importance of clarity of objectives, by a study in which he noted that the performance of students provided with precisely stated objectives was significantly better than that of students provided with either vaguely stated instructional objectives or short paragraphs of information. The point not always recognised is that behavioural objectives themselves can also vary considerably in clarity, and that this can be a major factor in determing whether, or not, they enhance student performance.

In reviewing an experiment in which the availability of behavioural objectives had made no significant difference to student performance Brown (1970) noted that some of the objectives involved were extremely difficult, and might well have influenced the outcome. The suggestion appears to be logical. If objectives are of extreme difficulty the majority of students will fail to master them, and it will be difficult to discriminate between the performance of students according to whether or not they are provided with the objectives. Similar arguments may be advanced concerning objectives of extreme facility, for if they are so readily mastered it is quite possible that the availability of a statement of objectives will make little difference to student performance against them. This suggests that the degree of difficulty of objectives should always be carefully noted in experiments concerned with behavioural objectives.

Rothkopf and Kaplan (1972, 1974) in a series of experiments investigated the effect of density* of text on student performance

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* Text density was defined as the proportion of relevant sentences in the text, a sentence being defined as relevant if it was clearly related to a specified objective.

against specified objectives (specified learning) and against objectives covered by the text, but not specified (non-specified learning)**. Early observations suggested that as the density of the text increased the probability of achieving a specified objective decreased. However, more refined observations made it clear that the crucial factor was the number of relevant sentences (and specified objectives) rather than the text density. Rothkopf and Kaplan concluded that as the number of specified objectives (and relevant sentences) increased the probability of achieving any one specified objective decreased. However, at the same time they noted that overall student performance (against specified and non specified objectives) increased as the number of specified objectives (and relevant sentences) increased. It would seem that the number of objectives specified, the relevance of the text, and the text items, are all important variables, the conditions of which should be carefully noted in studies.

The importance of student characteristics was highlighted by Kueter (1970). In observing the effect of behavioural objectives on student performance he took careful note of student personality traits. He concluded that the effectiveness of behavioural objectives was related to personality traits. Thus behavioural objectives made little difference to students who were highly conscientious, suggesting that if students are conscientious, or well motivated, the probability of achieving the objectives is quite high, regardless of whether or not they are specified along with the instructional material.

2.3 Inferences

A review of the above studies suggests a number of conditions under which behavioural objectives might be ineffective. These are summarised as follows:

a. If students are unaware of the objectives.

b. If the objectives are not sufficiently clear (too general or too ambiguous) to be of particular assistance.

** Rothkopf and Kaplan used the terms 'relevant' and 'incidental' learning for 'specified' and 'unspecified' learning.

c. If the objectives are of extreme facility or difficulty. (The readability of instructional material may often be related to this condition).

d. If the instructional material is not structured in such a way as to ensure that the specified objectives (and related test items) can be mastered (e.g. instructional material not sufficiently relevant).

e. If students are so highly motivated that they are likely to master the objectives regardless of whether or not they are specified. (The degree to which the instructional material interests the student is likely to relate to this condition).

In studies in which the provision of behavioural objectives is the independent variable it would seem logical to take careful note of any such conditions which might reduce the effectiveness of the objectives.

3.0 Restricting Expansion of Students' Horizons

The amount of research conducted into the question of whether the provision of behavioural objectives discourages students from expanding their horizons is minimal in comparison with that undertaken into the simpler question of whether the provision of behavioural objectives enhances student performance. Nevertheless, despite the limited amount of research undertaken to date the findings accummulating already appear to be contradictory. These are now considered in some detail because of the complex nature of the problem.

3.1 Empirical Evidence

Morse and Tillman (1972) studied the problem with a class of 52 students. At the end of a regular class session they gave their students an article on "Learning for Mastery", advising them to prepare for a test in the next session. For the experiment two lists of objectives, identified as lists A and B, had been prepared. Each list contained three objectives relating to the beginning,

middle, and end of the article. Students were divided at random into two equal groups, one receiving a copy of the list A objectives along with the article and the other receiving neither list. In the following session all students were given the same two tests: test A consisting of 20 items related to list A objectives and test B consisting of 20 items related to list B objectives. Students given list A objectives performed significantly better than the other group on test A, but there was no significant difference in performance of the two groups on test B. Morse and Tillman concluded that the provision of behavioural objectives enhanced student performance against specified objectives (list A) without detracting from performance against unspecified objectives (list B).

Duchastel (1972) performed a very similar experiment, but his findings were different from those of Morse and Tillman. Using a 2,400 word article on "Conditions Under Which Mushrooms Grow and Thrive" as the basis for his study, he developed 24 behavioural objectives and 24 related test items which he divided at random into two equal sub-groups. His subjects were 58 students divided at random into 2 equal groups. All students were given the same article, and advised that they had 30 minutes in which to study it for a test. One group received half the objectives and the other group none. The average student required a little over 19 minutes to study the material leaving ample time for review purposes. At the end of 30 minutes all students were tested against all 24 objectives. The group provided with a list of 12 specified objectives performed significantly better than the control group against the 12 related test items, but significantly worse against the test items related to the 12 non-specified objectives. As a result, Duchastel concluded that the provision of behavioural objectives enhanced student performance against specified objectives, but reduced performance against unspecified objectives.

Unfortunately, the above findings are confounded by observations made by Rothkopf and Kaplan (1972, 1974) in a series of studies. Three passages of material, varying in length from 842 to 1120 words, were used as a basis for the studies. Behavioural objectives were prepared for each of the passages such that each specific objective was related to a single sentence. Related test items were prepared

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* Duchastel used the terms 'relevant' and 'incidental' learning rather than 'specified' and 'unspecified' learning.

for each objective by removing a key word from the sentence concerned. The experimental designs developed were somewhat complex since the researchers were interested in the effect of density of text on student learning. However, the technique by which they studied the effect of specified objectives on intentional (specified) and incidental (unspecified) learning was very similar to that used in the studies already described. An initial group of 441 students was divided into a number of sub-groups provided with different numbers of specified objectives. Although students in each group were advised that they would only be tested on items related to the specified objectives, they were in fact tested on items covering almost every sentence in each passage studied, thereby permitting measurement of intentional and incidental learning. A control group of students studied the same passages without the help of specified objectives, and responded to the same tests. Study time was controlled by the students who were able to refer to the objectives specified while studying the passages. Not unexpectedly, Rothkopf and Kaplan concluded that the provision of behavioural objectives enhanced intentional learning against specified objectives. However, in addition, and in complete contrast to the findings already reported, they concluded that incidental learning was also enhanced by the provision of behavioural objectives.

3.2 Discussion of Anomalies

Some insight into the apparent contradictions described in the above studies may be obtained by turning to research concerned with the effect on learning of inserting questions into given texts.

In an early study Rothkopf (1965) investigated not only the effect of inserting questions into given texts, but also that of inserting questions either immediately before, or immediately after, the passages to which they referred. The question-related passages were described as relevant information and the questions as pre-, or post-, questions according to their location. In reading the instructional material containing either pre-, or post-, questions, students were not permitted to review any section of the text once it had been read. On completion they were tested to determine not only their acquired knowledge of relevant information, but also that of incidental information (that is textual information not related

to the inserted questions). A number of similar studies followed, and have been reviewed by Frase (1970).

Two major generalisations emerged from this work. First, Frase noted that in general the acquisition of relevant information was enhanced by the provision of inserted questions, with post-questions more effective than pre-questions in this respect. Second, he observed that in general the acquisition of incidental information tended to be enhanced by the provision of post-questions, but not by pre-questions, which in some cases depressed incidental learning below that of the control groups.

There is little doubt that the same questions can produce quite different learning outcomes according to their location in the text. Inserted immediately before related passages they appear to function as advance organisers (Ausubel, 1963), or as orienting stimuli (Rothkopf, 1970), directing student attention to the relevant, and away from the incidental. The effect is to enhance relevant learning but to depress incidental learning. Questions inserted immediately after related passages, however, appear to function as reinforcement stimuli, stimulating further consideration of the relevant without depressing incidental learning that has already taken place. The fact that post-questions can enhance not only relevant learning but also incidental learning suggests that when this occurs the two types of information are related.

Just as with behavioural objectives one might look for conditions under which inserted questions are unlikely to be effective stimuli.

Frase (1968) observed all the effects described above when questions were inserted one at a time before, or after, every 10 sentences of text. Relevant and incidental learning were enhanced by post-questions, while incidental learning was depressed by pre-questions. In addition he noted that students in the post-question group scored 40% higher overall, on combined relevant and incidental learning, than students in the pre-question group. However, when the same questions were presented in groups of 5 before, and after, every 50 sentences there was no difference in overall performance between students in the pre-, and post-, question groups.

In a further, somewhat similar, study Frase, Patrick and Schumer (1970) investigated whether the effectiveness of pre-, and post-, questions was affected by student motivation. To do this they assigned students to one of three basic groups, and advised them that according to whether they belonged to group 1, 2 or 3 they would be paid 0, 3 or 10 cents for each question they answered correctly on the post-test. Under low incentive conditions post-questions were noted to enhance student overall performance. However, as motivation increased the advantage of the post-question group over the pre-question, and control, groups decreased due to the improvement in performance of the latter.

3.3 Inferences

From the studies on inserted questions it is clear that the same questions can offer different stimuli to students according to their location in the text. Since behavioural objectives should clearly indicate what a student should be able to do as a result of the learning process, and how what he does should be measured, one might expect behavioural objectives to function in much the same way as inserted questions, producing orienting, or reinforcement, stimuli according to their location in the text, or according to the way in which they are used. With the research on inserted questions in mind it is of interest to contemplate the type of effects that we might expect from behavioural objectives in studies in which (as with studies on inserted questions) students are not permitted to review any part of the text once they have read it. The expectations might be summarised as follows:

a. Behavioural objectives might be expected to function as orienting, or reinforcement, stimuli according to whether they are placed immediately before, or after, the related instructional material. For ease of reference we might refer to such objectives as pre-, and post-, objectives.

b. We would expect both pre-, and post-, objectives to enhance specified learning, that is learning relevant to the specified objectives. However, we would expect post-objectives to be more effective than pre-objectives in this respect.

c. Pre-objectives might be expected to function as orienting stimuli, enhancing specified learning but depressing unspecified learning, that is learning not related to the objectives specified.

d. The effectiveness of both pre-, and post-, objective stimuli might be expected to increase if the objectives are spread throughout the text, rather than grouped together at the beginning or the end.

e. Student performance overall (against specified and unspecified objectives) should be enhanced more by post-objectives than by pre-objectives.

f. Although one might expect to observe the above effects in related studies on behavioural objectives they could well be hidden if the student body concerned is highly motivated. The effects could also be masked by other conditions such as those summarised in section 2.3.

One problem with the above analysis is that it is based on the assumption that students read through instructional material without reviewing any section once it has been read. This is an artificial condition which is far from representative of normal practice. Nevertheless, insights may be gained by considering not only the nature of behavioural objectives but also the way in which they are used. It is of interest to contemplate the contradictory findings of the Duchastel (1972) and Rothkopf and Kaplan (1972, 1974) studies in this way.

In the Duchastel study care was taken to ensure that students were fully aware of the role played by objectives. It would therefore be logical to assume that they used them as orienting stimuli to organise their learning. This would explain the enhanced performance against the specified objectives and the depressed performance against unspecified objectives. On the other hand the Rothkopf and Kaplan studies make no reference to any form of activity intended to ensure that the students concerned were fully aware of the role of behavioural objectives. Specific objectives were provided to students

along with the text, and students were permitted to review them as they read the text. Each objective was very specific being related to a single sentence in the material. They were presented to students in the same order as the sentences in the text, and varied in number from 10 to 37. Under such conditions it is quite possible that the students used the objectives as a check-list taking note of each objective as each related sentence was met. Under such conditions they would use the objectives as reinforcement stimuli. This would explain why student performance against unspecified objectives (incidental learning), as well as against specified objectives (relevant learning), was enhanced so long as the two were in some way related. This would seem to be quite possible since the sentences related to the specified, and unspecified, objectives were spread evenly throughout the instructional material concerned.

4.0 Conclusion

From this review it is clear that a variety of complex conditions determine whether or not behavioural objectives enhance relevant learning (against specified objectives) and depress, or enhance, incidental learning (against unspecified objectives), and there is little doubt that the two opposing claims reported at the beginning of this paper attempt to oversimplify what is in fact a complex situation. The development of two distinct schools of thought respectively supporting, and opposing, the use of behavioural objectives has tended to encourage such oversimplification. An alternative approach is required, and it is suggested that this should be one which treats behavioural objectives simply as one of several tools available to educators. Research has already helped to identify some of the advantages and limitations of behavioural objectives, and should be directed towards determining the conditions under which they can be used most effectively. It would then be the responsibility of individual educators to determine whether or not the tool is likely to be useful in their own particular situation.

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